531 Rec'd PCT/PTO 14 JUN 2001

FORM PTO-1390 (Modified) (REV 11-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 28944/37466

U S APPLICATION NO (IF KNOWN, SEE 37 CFR): 09/868731

INTERNATIONAL APPLICATION NO	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/FR99/03288	24.12.99	24.12.98

TITLE OF INVENTION
ADDRESSING METHOD AND NAME AND ADDRESS SERVER IN A DIGITAL NETWORK

APPLICANT(S) FOR DO/EO/US
FRANCOIS-ARNAUD REMAEL

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☒ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau
   c ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4))
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail EL564460065US
23. ☐ Other items or information:

SCANNED #

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U.S. APPLICATION NO (IF KNOWN, SEE 37 CFR)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
09/868731	PCT/FR99/03288	28944/37466

24. The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Neither international preliminary examination fee (37 CFR 1 482) nor international search fee (37 CFR 1 445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000.00**	
☒	International preliminary examination fee (37 CFR 1 482) not paid to USPTO but International Search Report prepared by the EPO or JPO . . **$860.00**	
☐	International preliminary examination fee (37 CFR 1 482) not paid to USPTO but international search fee (37 CFR 1 445(a)(2)) paid to USPTO . . **$710.00**	
☐	International preliminary examination fee (37 CFR 1 482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**	
☐	International preliminary examination fee (37 CFR 1 482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) . . **$100.00**	
	ENTER APPROPRIATE BASIC FEE AMOUNT =	**$860.00**
	Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1 492 (e))	**$0.00**

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	5 - 20 =	0	x $18.00	**$0.00**
Independent claims	2 - 3 =	0	x $80 00	**$0.00**
Multiple Dependent Claims **(check if applicable)**			☐	**$0.00**
	TOTAL OF ABOVE CALCULATIONS =			**$860.00**
☐	Applicant claims small entity status. (See 37 CFR 1.27). The fees indicated above are reduced by 1/2.			**$0.00**
	SUBTOTAL =			**$860.00**
	Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1 492 (f))			**$0.00**
	TOTAL NATIONAL FEE =			**$860.00**
☐	Fee for recording the enclosed assignment (37 CFR 1.21(h)) The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3 31) **(check if applicable).**			**$0.00**
	TOTAL FEES ENCLOSED =			**$860.00**
			Amount to be: refunded	$
			charged	$

a. ☒ A check in the amount of **$860.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **13-2855** A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

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Thomas A. Miller
NAME

40,091
REGISTRATION NUMBER

June 18, 2001
DATE

SCANNED #

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PATENT
Atty. Docket No.: 28944/37466

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Francois-Arnaud Remael Title: Addressing Method and Name and Address Server in a Digital Network U.S. Patent Application (U.S. National Phase of PCT/FR99/03288 filed on December 24, 1999) corresponding to French application no. 98 16449	I hereby certify that this document is being deposited with the United States Postal Service on **June 18, 2001**, in an envelope addressed to the Commissioner for Patents, Washington, D.C. 20231 utilizing the "Express Mail Post Office to Addressee" service of the United States Postal Service under Mailing Label No.: EL564460065US Richard Zimmermann

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, DC 20231

Dear Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Page 1, between lines 1 and 2, insert the heading --BACKGROUND OF THE INVENTION--.

Page 3, between lines 27 and 28, insert the heading --SUMMARY OF THE INVENTION--.

Page 7, before line 1, insert the heading --BRIEF DESCRIPTION OF THE DRAWINGS--.

Page 7, between lines 16 and 17, insert the heading --DESCRIPTION OF PREFERRED EMBODIMENTS--.

IN THE ABSTRACT:

Please cancel the abstract as printed in the front page of the PCT publication, and insert the Abstract of the Disclosure as submitted in the appended sheet.

IN THE CLAIMS:

Please amend Claims 1-5 of the application as follows:

1. (Amended) Method of addressing in a digital telecommunications network having first and second addressing zones between which an interface caters for address translations, comprising the following steps:

a name and address server situated in the first addressing zone receives, originating from a first address of the first zone, assigned to a source machine, a request to provide an address in relation to the name of a destination machine;

if the destination machine is situated in the second addressing zone, the name and address server sends to a second address of the first zone a first packet containing at least the said name of destination machine;

the interface retransmits the first packet to a first address of the second zone, assigned to a management unit and associated in a static manner with the second address of the first zone;

the management unit obtains a second address of the second zone assigned to the destination machine whose name appears in the first packet;

the management unit sends the interface a second packet destined for the name and address server comprising the second address of the second zone as origin address;

the interface transmits the second packet to the name and address server while replacing the origin address by a third address of the first zone, forming part of a list of addresses of the first zone allotted to the second addressing zone and associated in a dynamic manner with the second address of the second zone;

the name and address server receives the second packet, extracts therefrom the third address forming the origin address, and includes this third address in a response to the address provision request returned to the first address of the first zone.

2. (Amended) Method according to Claim 1, wherein the said first packet sent by the name and address sever to the said second address of the first zone contains, in addition to the said name of destination machine, a sequence number and/or an authentication key.

3. (Amended) Method according to Claim 1, wherein the name and address server includes in the response a lifetime cue representing a minimum duration of dynamic match between the said second address of the second zone and the said third address of the first zone.

4. (Amended) Method according to Claim 1 wherein the management unit or a second name and address server associated with this unit interrogates the destination machine after having obtained the second address of the second zone so as to confirm the presence of this destination machine before sending the second packet to the interface.

5. (Amended) Name and address server in a digital telecommunications network having first and second addressing zones between which an interface caters for address translations, the said server being situated in the first addressing zone and comprising:

a data storage module for storing associations between machine names and addresses of the first zone; and

a data processing module designed to respond to the receipt, originating from a first address of the first zone, of a request for provision of an address in relation to the name of a destination machine belonging to the second addressing zone through the transmission to a second address of the first zone of a first packet containing at least the said name of destination machine, and to send back to the said first address, after receipt from the second zone of a second packet containing a third address of the first zone associated in a dynamic manner with a second address of the second zone, a response providing the said third address of the first zone.

In accordance with the provisions of 37 CFR 1.121, the applicants attach hereto a marked-up version of the claim changes made by this amendment. The attachment is entitled "Version With Markings To Show Changes Made."

Should the examiner have any questions, he is respectfully invited to telephone the undersigned.

Respectfully submitted,

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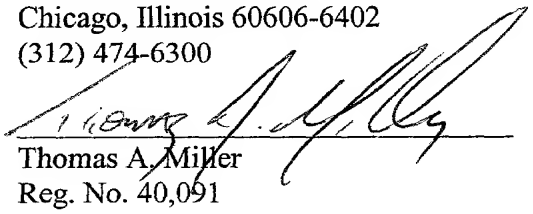
By: 

Thomas A. Miller
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June 18, 2001

Doc. #0503-1-US-PCT

ABSTRACT OF THE DISCLOSURE

In a digital telecommunications network having first and second addressing zones, a name and address server in the first addressing zone receiving from a first address of the first zone, assigned to a source machine, a request to provide an address in relation to the name of a destination machine situated in the second addressing zone, sends to a second address of the first zone a first packet containing at least the said name of destination machine, said second address of the first zone being associated in a static manner to a first address of the second zone, assigned to a management unit. The management unit sends to an interface a second packet destined for the name and address server comprising as origin address, a second address of the second zone assigned to the destination machine. The interface transmits the second packet to the name and address server while replacing the origin address by a third address of the first zone, forming part of a list of addresses of the first zone, forming part of a list of addresses of the first zone allotted to the second addressing zone and associated in a dynamic manner with the second address of the second zone. The name and address server includes this third address in a response to the address provision request returned to the first address of the first zone.

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend Claims 1-5 of the application as follows:

1. (Amended) Method of addressing in a digital telecommunications network having first and second addressing zones [(Z1, Z2)] between which an interface [(INT)] caters for address translations, comprising the following steps:

a name and address server [(DNS1)] situated in the first addressing zone [(Z1)] receives, originating from a first address [(AD1, 1)] of the first zone, assigned to a source machine [(10)], a request [(REQ1)] to provide an address in relation to the name [(N)] of a destination machine [(20)];

if the destination machine [(20)] is situated in the second addressing zone [(Z2)], the name and address server [(DNS1)] sends to a second address [(AD2, 1)] of the first zone a first packet [(IP1)] containing at least the said name [(N)] of destination machine [(20)];

the interface [(INT)] retransmits the first packet [(IP1)] to a first address [(AD1, 2)] of the second zone, assigned to a management unit [(22)] and associated in a static manner with the second address [(AD2, 1)] of the first zone;

the management unit [(22)] obtains a second address [(AD2, 2)] of the second zone assigned to the destination machine [(20)] whose name [(N)] appears in the first packet [(IP1)];

the management unit [(22)] sends the interface [(INT)] a second packet [(IP2)] destined for the name and address server [(DNS1)] comprising the second address [(AD2, 2)] of the second zone as origin address;

the interface [(INT)] transmits the second packet [(IP2)] to the name and address server [(DNS1)] while replacing the origin address by a third address [(AD3, 1)] of the first

zone, forming part of a list [(P)] of addresses of the first zone [(Z1)] allotted to the second addressing zone [(Z2)] and associated in a dynamic manner with the second address [(AD2, 2)] of the second zone;

the name and address server [(DNS1)] receives the second packet [(IP2)], extracts therefrom the third address [(AD3, 1)] forming the origin address, and includes this third address [(AD3, 1)] in a response [(REP)] to the address provision request [(REQ1)] returned to the first address [(AD1, 1)] of the first zone.

2. (Amended) Method according to Claim 1, [in which] wherein the said first packet [(IP1)] sent by the name and address sever [(DNS1)] to the said second address [(AD2, 1)] of the first zone contains, in addition to the said name [(N)] of destination machine [(20)], a sequence number [(S)] and/or an authentication key [(K)].

3. (Amended) Method according to Claim 1 [or 2], [in which] wherein the name and address server [(DNS1)] includes in the response [(REP)] a lifetime cue [(TTL)] representing a minimum duration of dynamic match between the said second address of the second zone [(AD2, 2)] and the said third address of the first zone [(AD3, 1)].

4. (Amended) Method according to [any one of Claims 1 to 3, in which] Claim 1 wherein the management unit [(22)] or a second name and address server (DNS2) associated with this unit interrogates the destination machine [(20)] after having obtained the second address of the second zone [(AD2, 2)] so as to confirm the presence of this destination machine before sending the second packet [(IP2)] to the interface [(INT)].

5. (Amended) Name and address server [(DNS1)] in a digital telecommunications network having first and second addressing zones [(Z1, Z2)] between which an interface [(INT)] caters for address translations, the said server [(DNS1)] being situated in the first addressing zone [(Z1)] and comprising:

a data storage module [(14)] for storing associations between machine names and addresses of the first zone; and

a data processing module [(12)] designed to respond to the receipt, originating from a first address [(AD1, 1)] of the first zone, of a request [(REQ1)] for provision of an address in relation to the name [(N)] of a destination machine [(20)] belonging to the second addressing zone through the transmission to a second address [(AD2, 1)] of the first zone of a first packet [(IP1)] containing at least the said name [(N)] of destination machine [(20)], and to send back to the said first address [(AD1, 1)], after receipt from the second zone of a second packet containing [an address (AD2, 2)] a third address of the first zone associated in a dynamic manner with a second address of the second zone, a response providing the said [address of the second] third address of the first zone.

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ADDRESSING METHOD AND NAME AND ADDRESS SERVER IN A DIGITAL NETWORK

The present invention relates to an addressing method in a digital telecommunications network, as well as to a name and address server implementing such a method.

The invention belongs to the field of the addressing of networked machines. It applies more particularly to a digital telecommunications network having first and second addressing zones, between which an interface unit caters for address translations.

Specifically, if the addressing used in the first zone is different from that used in the second zone, the communication between a source machine situated in one zone and a destination machine situated in the other zone requires in particular the translation of the addresses assigned to these machines, at the level of the interface between the two addressing zones.

IP ("Internet Protocol") addressing, that is to say the address allocation mode used by Internet, is generally an addressing of dynamic type in low-speed on-line networks.

When a customer connects to an Internet service provider, or ISP, which communicates with this customer by means of a private address, the ISP allots an address from a list of public IP addresses which it holds. The customer can then communicate with the public domain by means of the public address which has been allotted to him. As soon as the customer disconnects, the address which had been allotted to him becomes available again for another user.

This organization has hitherto been rendered possible by the fact that the customers of ISPs are often wont to disconnect, on the one hand because the charge is

often dependent on the duration of the connections, and on the other hand because these customers wish to free their telephone line so as to be able to be contacted.

However, there is currently a trend to bill at a flat rate rather than as a function of the duration of the connections, so that the number of disconnections will likely tend to diminish.

Furthermore, the customers are no longer necessarily constrained to disconnect in order to free their telephone line, given that there are relatively recent telecommunications techniques allowing the simultaneous use of the telephone service and consultation services. Among these techniques may be cited for example the use of a separate medium such as cable, or else the implementation of ADSL ("Asymmetric Digital Subscriber Line") links.

Within such a context of economic and technical change, customers are no longer likely to suffer the constraint of having to disconnect as often as hitherto. In this case, the use of the aforesaid technique will no longer be suitable for recovering the IP address of a customer with a view to reallocating it.

As a solution for remedying the lack of public addresses, under certain conditions it is possible to use a private addressing, that is to say to allocate the customer a private address and then on exiting the private zone controlled by the ISP to carry out an address translation with the aid of the NAT function.

The NAT or network address translation function, generally installed at a point of exit of the private domain which uses specific local addressing, implements the aforesaid dynamic addressing: it manages a list of public IP addresses and matches a private address of a calling machine with an IP address picked from the

list, and performs an address translation in respect of each packet arriving at the NAT point and which travels from the calling machine of the private domain to a contacted machine of the public domain.

Thus, for the contacted machine, everything happens as if the address of the calling machine of the private domain were the public address contained in the list of IP addresses.

The contacted machine therefore responds to the calling machine to this address, and when a response packet arrives at the NAT point, the router effects the translation of the address contained in the list of IP addresses to the destination private address and forwards the packet in the private domain to the calling machine.

A drawback of this addressing mechanism is that it does not allow a machine of the public addressing domain to send a packet to a machine of the private addressing domain without action by the latter machine, since the matching of the addresses is dynamic, hence temporary, and since the private address is unknown to the routing tables.

Furthermore, within the framework of new applications such as Internet telephony, it is currently necessary to possess an IP address in order to be able to be contacted, so that the data packets can be routed to the corresponding machine.

The aim of the present invention is to alleviate the aforesaid drawbacks by facilitating the establishment of communications from the public domain to the private domain.

To do this, the present invention proposes a method of addressing in a digital telecommunications network

having first and second addressing zones between which an interface caters for address translations, comprising the following steps:

- a name and address server situated in the first addressing zone receives, originating from a first address of the first zone, assigned to a source machine, a request to provide an address in relation to the name of a destination machine;
- if the destination machine is situated in the second addressing zone, the name and address server sends to a second address of the first zone a first packet containing at least the name of the destination machine;
- the interface retransmits the first packet to a first address of the second zone, assigned to a management unit and associated in a static manner with the second address of the first zone;
- the management unit obtains a second address of the second zone assigned to the destination machine whose name appears in the first packet;
- the management unit sends the interface a second packet destined for the name and address server comprising the second address of the second zone as origin address;
- the interface transmits the second packet to the name and address server while replacing the origin address by a third address of the first zone, forming part of a list of addresses of the first zone allotted to the second addressing zone and associated in a dynamic manner with the second address of the second zone;
- the name and address server receives the second packet, extracts therefrom the third address forming the origin address, and includes this third address in a response to the address provision request returned to the first address of the first zone.

The method thus comprises the association of the NAT function with the conventional functions of a name and

address server or DNS ("domain name server"), which functions consist among other things in obtaining the IP address which corresponds to a machine name.

Thus, the present invention allows a source machine of the public addressing zone to establish a connection with a view to communicating with a destination machine of the private addressing zone, by conveying the appropriate names and addresses between the two addressing zones.

The solution proposed consists in maintaining, at the level of the public domain/private domain interface, a static association between the second address of the first zone, that is to say the public address known to the name and address server, and an address of the second zone corresponding to the private address assigned to the management unit.

In a particular embodiment of the method allowing better synchronization, the first packet sent by the name and address server to the second address of the first zone contains, in addition to the name of the destination machine, a sequence number.

In a particular embodiment of the method affording greater security of transmission, the first packet sent by the name and address server to the second address of the first zone contains, in addition to the name of the destination machine, an authentication key.

According to another aspect, in order to achieve the aforesaid aim, the present invention also proposes a name and address server in a digital telecommunications network having first and second addressing zones between which an interface caters for address translations, the said server being situated in the first addressing zone and comprising:

- a data storage module for storing associations between machine names and addresses of the first zone; and

- a data processing module designed to respond to the receipt, originating from a first address of the first zone, of a request for provision of an address in relation to the name of a destination machine belonging to the second addressing zone through the transmission to a second address of the first zone of a first packet containing at least the said name of destination machine, and to send back to the said first address, after receipt from the second zone of a second packet containing an address of the second zone, a response providing the said address of the second zone.

The name and address server exhibits in particular the feature of addressing itself systematically to the management unit when it receives a request for addressing to the private addressing zone.

Coupled with the NAT function, the name and address server establishes a match between the private address of the destination machine and a dynamic address emanating from the list of IP addresses and sends back this IP address in the guise of response to the source machine. The source machine can then contact the destination machine.

Neither the name and address server, nor the management unit constitute points of transit of the traffic in the network. Consequently, the structure and manner of operation of these two entities are not apt to create a bottleneck for the traffic.

Furthermore, the invention makes it possible to manipulate a number of IP addresses related, not to the number of customers, but to the number of connections established from the private addressing zone to the public addressing zone.

Other aspects and advantages of the present invention will become apparent on reading the description which follows of a particular embodiment, given by way of nonlimiting example. The description refers to the drawings which accompany it, in which:

- Figure 1 diagrammatically illustrates various entities which co-operate to implement the addressing method of the invention, as well as messages exchanged by these entities in the course of the successive steps of the addressing method of the invention, in a particular embodiment; and
- Figure 2 diagrammatically represents a name and address server according to the invention, in a particular embodiment.

By way of nonlimiting example, the present invention will be described here in its application to a network in which the first addressing zone uses so-called "public" IP addresses, in accordance with the address allocation mode used by the Internet network, and the second addressing zone uses so-called "private" specific local addresses allocated independently of the public addresses.

The solution described relies on the assumption according to which the Internet network implements addresses in the format of the V4 IP protocol.

When a machine of the second addressing zone (private) wishes to establish a connection to a machine of the first addressing zone (Internet), the conventional NAT function is simply implemented. The succession of the corresponding conventional steps will therefore not be described here.

The public domain, or first addressing zone, is understood here to include machines which would be contained in private domains linked to the Internet

other than the private domain in respect of which the invention is implemented. What matters is that a public address (temporary or permanent) be allocated to these machines.

As shown by figure 1, the invention is intended to allow communication from a "source" machine 10, situated in the public domain Z1, to a "destination" machine 20, situated in the private domain Z2.

In a conventional manner, the source machine 10 firstly searches for a match between the name N of the destination machine 20, which it knows, and the address of this machine 20.

To do this, in a manner known per se, the source machine 10, whose public address is AD1,1, transmits an address provision request REQ1 to a name and address server DNS1 situated in the zone Z1.

The request REQ1 exhibits a customary form, with in particular the source address AD1,1 and the name N of the destination machine, which name is for example of the type "toto.ft.fr".

As shown by figure 1, the name and address server DNS1 then transmits a first data packet IP1 to a second address AD2,1 of the zone Z1, the public address known to the server DNS1.

The server DNS1 identifies, on the basis of all or part of the name N, that the request relates to the relevant private domain. It can for example contain a table indicating that the names terminate with the suffix "ft.fr" relating to the relevant private domain, so that the requests REQ1 comprising such names have to form the subject of the transmission of a packet IP1 to the address AD2,1.

The packet IP1 is destined for a management unit 22 situated in the second addressing zone Z2 of the private network. A private address AD1,2 is assigned in the zone Z2 to the management unit 22.

The packet IP1 exhibits a conventional IP structure and contains in particular the public address of the name and address server DNS1 as source address, the public address AD2,1 as destination address, and in its data part ("payload"), the name N of the destination machine, for example "toto.ft.fr".

As an option, the packet IP1 can also contain, for synchronization purposes, a sequence number S in the form of a predetermined number of bits and/or, for security purposes, a public or private authentication key K associated with a data enciphering and/or electronic signature algorithm.

The second address AD2,1 of the zone Z1 is known both to the name and address server DNS1 and to an interface INT, a basic function of which consists in effecting the translation of addresses between the zones Z1 and Z2.

Advantageously, the address translation function effected by the INT interface is carried out by a router of conventional type, this requiring no modification of the router. Nevertheless, as a variant, the interface INT can form an innate entity, independent of the router.

When the INT interface receives the packet IP1 sent to the public address AD2,1, it retransmits it to the management unit 22, to its private address AD1,2.

Thereafter, the management unit 22 transmits a request REQ2 to a name and address server of conventional type DNS2 of the zone Z2, so as to ascertain the match

between the name "toto.ft.fr" of the destination machine 20 and its private address AD2,2. The response to the request REQ2 therefore contains a private address, for example of the type "a.b.c.d", a, b, c and d designating decimal numbers, according to the customary format of IP addresses. Consider arbitrarily "10.10.10.4" the private address corresponding to the machine "toto.ft.fr".

As a variant, the functions catered for by the name and address server DNS2 and by the management unit 22 can be brought together into a single module. In this case, the request step REQ2 can be dispensed with and the single module obtains the private address "10.10.10.4" directly.

As an option, the management unit 22 and/or the server DNS2 can interrogate the destination machine 20 at the address AD2,2 so as to ascertain whether it is present on the private network, that is to say active and connected (message PNG1 of figure 1). If the machine 20 is present, it responds with an acknowledgement message PNG2.

Thereafter, the management unit 22 sends the interface INT a second packet IP, denoted IP2, containing as source address the private address AD2,2, here "10.10.10.4", of the destination machine "toto.ft.fr", and as destination address the public address of the name and address server DNS1 of the zone Z1.

The data part of the second packet IP2 borrows elements of the first packet IP1, such as the name of the source machine 10 and the sequence number S for synchronization.

When it receives the second packet IP2, the interface INT replaces the source address AD2,2 with a third address AD3,1 of the zone Z1.

The third address AD3,1 forms part of a list P of IP addresses of the zone Z1, allotted to the zone Z2. Consider arbitrarily AD3,1 = "192.4.147.2". The interface INT creates a dynamic association, for example with the aid of a conventional NAT function, between the address AD3,1 and the source address AD2,2 which it has received, and retransmits the packet IP2 with the address AD3,1 instead of the address AD2,2 to the name and address server DNS1.

Therefore, the name and address server DNS1, on receipt of the packet IP2, extracts therefrom the third address AD3,1 and includes it in a response REP to the address provision request REQ1 originating initially from the source machine 10 of the zone Z1, by way of the address AD1,1.

The response REP contains, in a manner known per se, a datum indicative of the minimum duration of validity of the dynamic association between the addresses AD3,1 and AD2,2. This datum is dependent on the configuration parameters of the interface INT, that is to say of the router in the case where the functions of the interface are carried out by a router.

The divert time cue (TTL field according to the IP protocol) included by the server DNS1 in the response REP can thus represent the minimum duration of the dynamic match between the private address AD2,2 of the destination machine and its temporary public address AD3,1. This cue is provided by the NAT function of the interface INT.

The source machine 10 of the zone Z1 is then able to establish a connection with the destination machine 20 of the zone Z2, by transmitting to the address AD3,1. The NAT function of the interface INT will cater for the address translations required.

Figure 2 diagrammatically represents the overall structure of a name and address server such as the server DNS1, capable of co-operating with a management unit with a view to implementing a method of addressing of the type described hereinabove.

In the particular embodiment represented in Figure 2, the server DNS1 comprises a data processing module 12 which carries out in a conventional manner the association between machine names contained in incoming packets and IP addresses emanating from match-up tables stored in a memory 14, which are sent back in response messages. When the name pertains to the private domain 21 to which the invention is applied, the module 12 sends the packet IP1 to the public address AD2,1 of the zone Z1, obtained from the memory 14. Thereafter, when the module 12 receives the packet IP2, which comprises the address AD3,1 associated in a dynamic manner with the address AD2,2 of the destination machine 20, it includes this address AD3,1 in the response REP to the address provision request REQ1 originating from the address AD1,1 of the source machine 10.

CLAIMS

1. Method of addressing in a digital telecommunications network having first and second addressing zones (Z1,Z2) between which an interface (INT) caters for address translations, comprising the following steps:

- a name and address server (DNS1) situated in the first addressing zone (Z1) receives, originating from a first address (AD1,1) of the first zone, assigned to a source machine (10), a request (REQ1) to provide an address in relation to the name (N) of a destination machine (20);

- if the destination machine (20) is situated in the second addressing zone (Z2), the name and address server (DNS1) sends to a second address (AD2,1) of the first zone a first packet (IP1) containing at least the said name (N) of destination machine (20);

- the interface (INT) retransmits the first packet (IP1) to a first address (AD1,2) of the second zone, assigned to a management unit (22) and associated in a static manner with the second address (AD2,1) of the first zone;

- the management unit (22) obtains a second address (AD2,2) of the second zone assigned to the destination machine (20) whose name (N) appears in the first packet (IP1);

- the management unit (22) sends the interface (INT) a second packet (IP2) destined for the name and address server (DNS1) comprising the second address (AD2,2) of the second zone as origin address;

- the interface (INT) transmits the second packet (IP2) to the name and address server (DNS1) while replacing the origin address by a third address (AD3,1) of the first zone, forming part of a list (P) of addresses of the first zone (Z1) allotted to the second addressing zone (Z2) and associated in a dynamic manner with the second address (AD2,2) of the second zone;

- the name and address server (DNS1) receives the second packet (IP2), extracts therefrom the third address (AD3,1) forming the origin address, and includes this third address (AD3,1) in a response (REP) to the address provision request (REQ1) returned to the first address (AD1,1) of the first zone.

2. Method according to Claim 1, in which the said first packet (IP1) sent by the name and address server (DNS1) to the said second address (AD2,1) of the first zone contains, in addition to the said name (N) of destination machine (20), a sequence number (S) and/or an authentication key (K).

3. Method according to Claim 1 or 2, in which the name and address server (DNS1) includes in the response (REP) a lifetime cue (TTL) representing a minimum duration of dynamic match between the said second address of the second zone (AD2,2) and the said third address of the first zone (AD3,1).

4. Method according to any one of Claims 1 to 3, in which the management unit (22) or a second name and address server (DNS2) associated with this unit interrogates the destination machine (20) after having obtained the second address of the second zone (AD2,2) so as to confirm the presence of this destination machine before sending the second packet (IP2) to the interface (INT).

5. Name and address server (DNS1) in a digital telecommunications network having first and second addressing zones (Z1,Z2) between which an interface (INT) caters for address translations, the said server (DNS1) being situated in the first addressing zone (Z1) and comprising:

- a data storage module (14) for storing associations between machine names and addresses of the first zone; and

- a data processing module (12) designed to respond to the receipt, originating from a first address (AD1,1) of the first zone, of a request (REQ1) for provision of an address in relation to the name (N) of a destination machine (20) belonging to the second addressing zone through the transmission to a second address (AD2,1) of the first zone of a first packet (IP1) containing at least the said name (N) of destination machine (20), and to send back to the said first address (AD1,1), after receipt from the second zone of a second packet containing an address (AD2,2) of the second zone, a response providing the said address of the second zone.

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FIG. 1

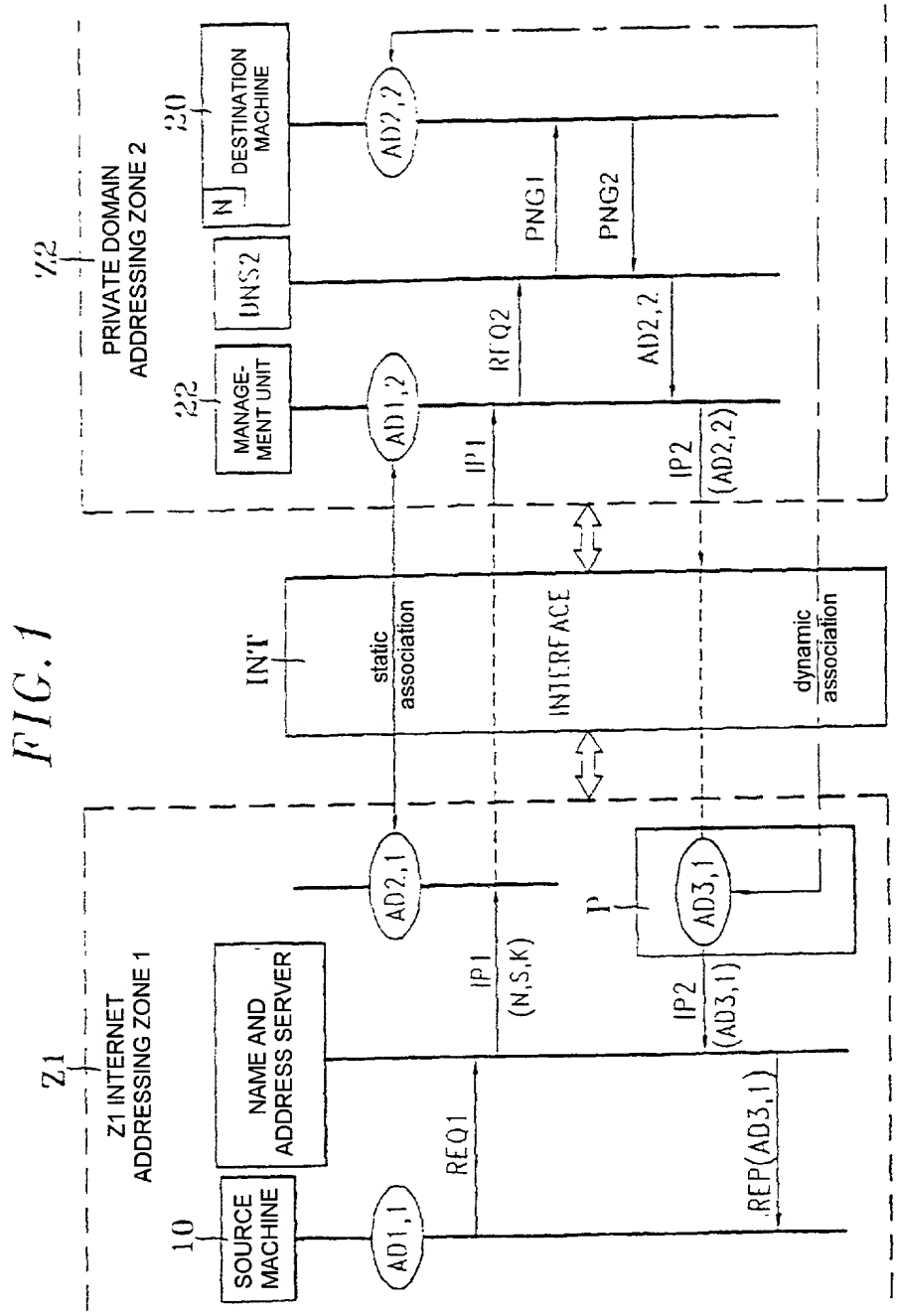
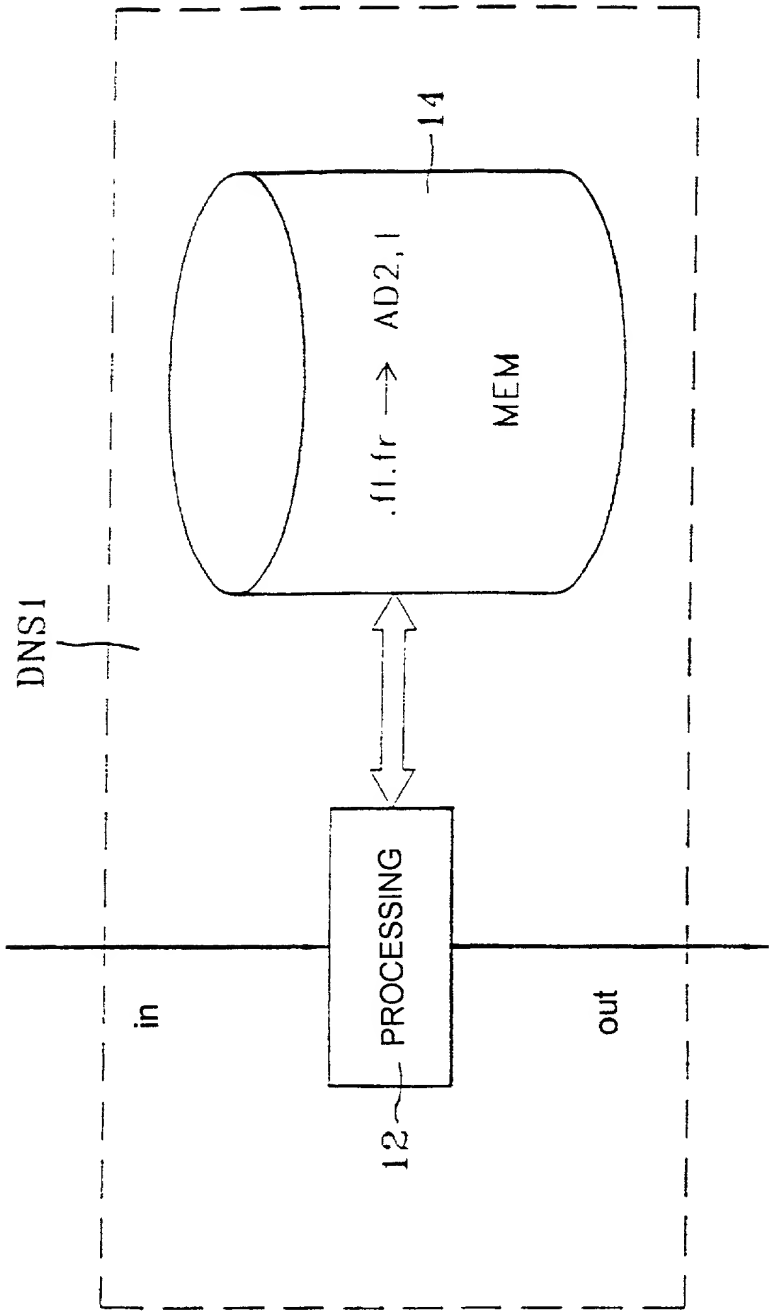

Z1 INTERNET ADDRESSING ZONE 1
Z2 PRIVATE DOMAIN ADDRESSING ZONE 2
10
SOURCE MACHINE
NAME AND ADDRESS SERVER
MANAGE-MENT UNIT
DNS2
N
DESTINATION MACHINE
22
120
INT
static association
INTERFACE
dynamic association
AD1,1
AD2,1
AD3,1
AD1,2
AD2,2
REQ1
IP1 (N,S,K)
IP2 (AD3,1)
REP(AD3,1)
RFQ2
IP1
IP2 (AD2,2)
PNG1
PNG2
P

FIG. 2



DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name; I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled " ADDRESSING METHOD AND NAME AND ADDRESS SERVER IN A DIGITAL NETWORK.

the specification of which (check one) ☐ is attached hereto; ☒ was filed on June 18, 2001 as Application Serial No. 09/868 731 and was amended on _____ (if applicable). ☐ was filed as PCT International Application No. _____ on _____ and was amended under Article 19 on _____ (if applicable). I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

(Application Serial Number)	(Country)	(Day/Month/Year Filed)	Priority Claimed Yes	No
9816449	FRANCE	24-12-1998	☒	☐
			☐	☐

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below:

(Application Serial Number)	(Day/Month/Year Filed)

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s) or PCT international application(s) designating the United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior application(s) in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56 which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

(Application Serial Number)	(Day/Month/Year Filed)	(Status-Patented, Pending or Abandoned)
PCT/FR99/03288	24-12-1999	

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: I hereby appoint as my attorneys, with full powers of substitution and revocation, to prosecute this application ans transact all business in the Patent and Trademark Office connected herewith:

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